Patent Claims:

1. A sensor for detecting a substance in a liquid, said sensor comprising a primary substrate and a sensor unit connected to said primary substrate, said primary substrate being shaped as a pillar, said sensor comprising detecting means for detecting a change of stress or mass generated on a surface area of the sensor unit, and an electric communication line for applying a voltage over said detection means, at least one of said wires being integrated in said pillar shaped primary substrate.

2. A sensor according to claim 1 wherein said sensor unit is a flexible unit in the form of a cantilever, such as a cantilever connected to one pillar shaped substrate, and a cantilever connected to two pillar shaped substrates e.g. a bridge.

3. A sensor according to any one of the claims 1 and 2 wherein said sensor unit is a flexible sheet-formed unit having an average thickness which is less than both its average length and its average width.

4. A sensor according to any one of the claims 1-3 wherein said means for detecting a change of stress generated on a surface area of the sensor unit is in the form of a surface stress sensing element integrated in the sensor unit, said electric communication line including a pair of wires for applying an electrical field over the surface stress sensing element, said surface stress sensing element preferably being selected from the group consisting of a piezoelectric element, a

strain gauge, a Si or C nanotube, a capacitor and a piezoresistor.

5. A sensor according to any one of the claims 1-3 wherein said means for detecting a change of stress generated on a surface area of the sensor unit is in the form of a laser system.

6. A sensor according to any one of the claims 1-5 wherein said pillar shaped primary substrate has an uppermost surface and a lowermost surface and a height defined as the shortest distance between said uppermost and lowermost surfaces, which sensor unit is a flexible sheet-formed unit having two major surfaces, said sensor unit being connected to said primary substrate so that it protrudes from the primary substrate, said upper surface of said sensor unit having an angle to the uppermost surface of said primary substrate between 135° and 225°, said upper surface of said sensor unit preferably being substantially parallel to the uppermost surface of said primary substrate, said uppermost surface of said primary substrate and said upper surface of the sensor unit preferably being in direct prolongation of each other.

7. A sensor according to claim 6 wherein said uppermost surface of the primary substrate is substantially plane and said electric communication line passes through the primary substrate in a sum line having an angle of at least 45° or at least 65°, such as about 90° to the uppermost surface of the primary substrate.

8. A sensor according to any one of the preceding claims wherein one or both of the wires of said electric communication line pass through the primary substrate and

exit the primary substrate to provide electric communication line exit(s) at the lowermost surface of the primary substrate, said lowermost surface of the primary substrate being connected to a secondary substrate.

9. A sensor according to any one of the preceding claims wherein one or both of the wires of said electric communication line pass through the primary substrate material in a substantially straight line.

10. A sensor according to claim 4 wherein said surface stress sensing element in the form of a piezoresistor or a strain gauge comprises or preferably consists of a material selected from the group consisting of amorph silicon, polysilicon, single crystal silicon, metal or metal containing composition, e.g. gold, AlN, Ag, Cu, Pt and Al conducting polymers, such as, doped octafunctional epoxidized novalac e.g. doped SU-8, and composite materials with an electrically non-conducting matrix and a conducting filler, wherein the filler preferably is selected from the group consisting of amorph silicon, polysilicon, single crystal silicon, metal or metal containing composition, e.g. gold, AlN, Ag, Cu, Pt and Al, semi-conductors, carbon black, carbon fibres, particulate carbon, carbon nanowires, silicon nanowires.

11. A sensor according to claim 4 wherein said capacitor in the form of two conducting elements of e.g. metal or conductive polymers is separated in a distance of up to about 5 μm from each other by a dielectricum selected from the group consisting of liquid, gas or

solids e.g. air, and octafunctional epoxidized novalac e.g. SU-8.

12. A sensor according to any one of the preceding claims wherein said primary substrate comprises one or more of the materials selected from the group consisting of silicon, silicon nitride, silicon oxide, metal, metal oxide, glass and polymer, wherein the group of polymers preferably includes epoxy resin e.g. an octafunctional epoxidized novalac, polystyrene, polyethylene, polyvinylacetate, polyvinylcloride, polyvinylpyrrolidone, polyacrylonitrile, polymethylmetacrylate, polytetrafluoroethylene, polycarbonate, poly-4-methylpentylene, polyester, polypropylene, cellulose, nitrocellulose, starch, polysaccarides, natural rubber, butyl rubber, styrene butadiene rubber and silicon rubber.

13. A sensor according to any one of the preceding claims wherein said sensor unit is based on a material included in the primary substrate, preferably said sensor unit is based on the same material as that of the primary substrate, more preferably said sensor unit being integrated with said primary substrate.

14. A sensor according to any one of the preceding claims wherein said primary substrate and said secondary substrate are of the same material.

15. A sensor according to any one of the preceding claims wherein said cantilever is connected to one pillar shaped primary substrate and protrudes from the primary substrate in one or more cantilever protruding directions to provide a free edge of said cantilever, said

cantilever having a two-dimensional cantilever shape defined as the shape surrounded by the cantilever free edge and the stem line along the connection to the pillar shaped primary substrate, which shape may be regular or irregular, and preferably is selected from the group consisting of square, rectangular, triangular, pentagonal, hexagonal, leaf shaped, circular and oval periphery.

16. A sensor according to any one of the claims 1-14 wherein said sensor unit in the form of a cantilever is connected to two pillars shaped primary substrates to thereby form a bridge.

17. A sensor according to any one of the claims 15 and 16 wherein said primary substrate has an uppermost surface or said primary substrates have uppermost surfaces, said uppermost substrate surface(s) being substantially parallel with the upper surface of the cantilever when the cantilever is in a non stressed state.

18. A sensor according to any one of the claims 15-17 wherein both of said wires in the pair of wires pass through the primary substrate or substrates in a sum line having an angle which is substantially perpendicular to the uppermost substrate surface(s), the centre line of the pillar shaped primary substrate(s) preferably being perpendicular +- 20^{o} to uppermost surface thereof, which wires pass through the primary substrate and exit the pillar shaped primary substrate(s) at its lowermost surface.

19. A sensor according to claim 18 wherein said pillar shaped primary substrate(s) is/are connected to a secondary substrate comprising a circuit for applying the voltage, said secondary substrate preferably being an electronic chip comprising contact pads corresponding with said wire exits.

20. A sensor according to any one of the claims 17-19 wherein said pillar shaped primary substrate(s) is/are connected to two or more cantilevers, the wires of which cantilevers pass through the pillar shaped primary substrate(s), said cantilevers preferably having a two-dimensional cantilever shape which is substantially identical to each other, more preferably said two-dimensional cantilever shape preferably being selected from the group consisting of square, rectangular, triangular, pentagonal, hexagonal and leaf shaped periphery.

21. A sensor according to any one of the preceding claims further comprising a secondary substrate supporting said pillar shaped primary substrate or substrates, said secondary substrate comprising an electric supply line for supplying an electric field over the respective pair(s) of wires, said wires preferably being guided through the secondary substrate.

22. A sensor according to claim 21 wherein said secondary substrate is an electronic chip comprising contact pads corresponding with said wire exits.

23. A sensor according to any one of the claims 21-22 wherein said secondary substrate carries an array of pillar shaped primary substrates carrying sensor units

connected thereto, wherein the wires are incorporated in the primary substrates.

24. A sensor according to any one of the preceding claims wherein said sensor comprises a secondary substrate and a plurality of pillar shaped primary substrates, each of said pillar shaped primary substrates having an uppermost surface and a lowermost surface, and a pillar wall surface, said pillar shaped primary substrates being connected to said secondary substrate at its lowermost surface, said sensor comprising a liquid chamber capable of containing a liquid so that liquid can be applied in said liquid chamber to surround one or more, preferably all of said pillar shaped primary substrates so that the pillar wall extending around said pillar shaped substrate and at least a part of the sensor unit connected to the pillar shaped substrates are contacted with the liquid.

25. A sensor according to any one of the preceding claims wherein said sensor further comprises a fluid channel, said sensor units partly or totally being disposed in said fluid channel, said pillar shaped primary substrates preferably being disposed in said fluid channel.

26. A sensor according to any one of the preceding claims wherein said sensor comprises at least one sensor unit having a target surface area, which area has been functionalised by linking of one or more functional groups comprising a detection ligand to said target surface area, said detection ligand being a member of a specific binding pair.

27. A sensor according to any one of the preceding claims wherein the sensor comprises at least two sensor units, at least one of said sensor units being a reference unit.

28. A sensor according to claim 27 wherein said reference unit comprises a target surface area, which area has a surface chemistry different from the sensor unit for which the reference unit acts as reference, preferably said target surface area has been functionalised by linking of one or more functional groups, wherein said one or more functional groups linked to the surface area of said reference unit or its concentration are different from the sensor unit for which the reference unit acts as reference.